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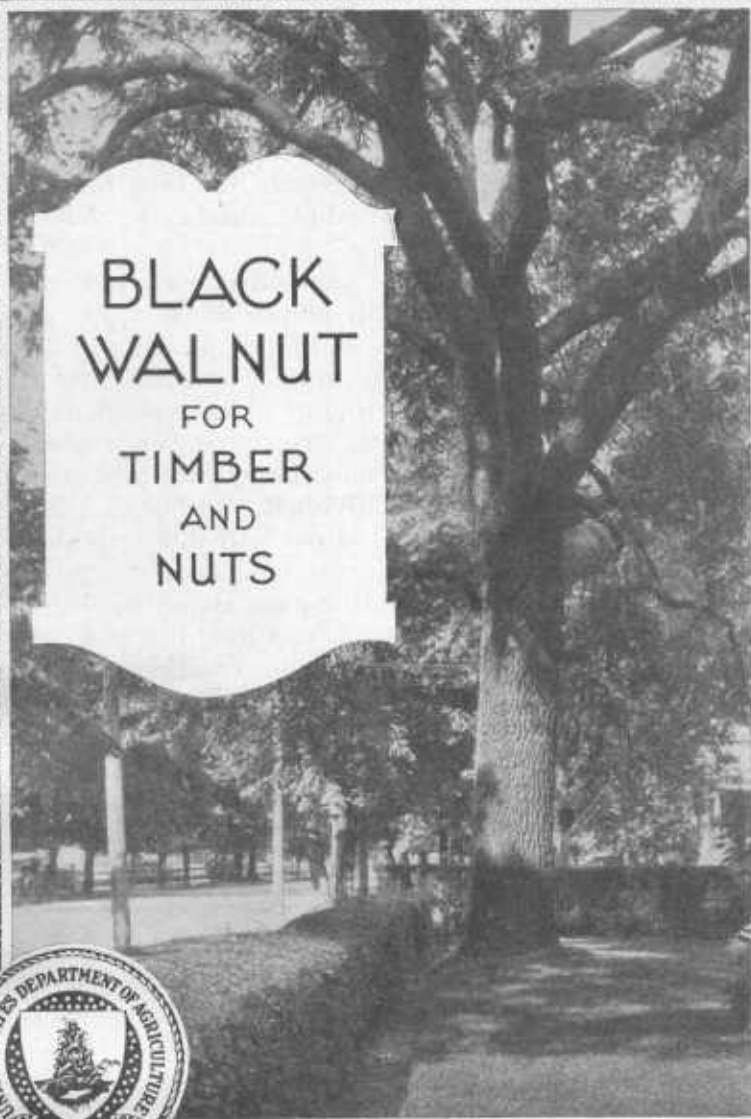
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BLACK
WALNUT
FOR
TIMBER
AND
NUTS



BLACK WALNUT trees are easily started, grow at a fair rate, attain large size and long life, do not prevent grazing, yield edible nuts, and produce useful and valuable timber.

Black walnut should be planted in rich, agricultural soils which are both amply moist and well drained. Because of the good grade of soil and the length of time required to produce valuable timber in forest stands, the planting of black walnut on a large scale by individual farmers is not recommended. Black walnut may be grown profitably for timber and nuts as individual trees, or in small groups on good land that is not valuable for other purposes.

The illustration on the title-page shows the large size, handsome development, and long life of black walnut grown under favorable conditions. The beauty and value of this tree are commonly not fully appreciated.

BLACK WALNUT FOR TIMBER AND NUTS

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THE BLACK WALNUT (*Juglans nigra* L.) is one of the most valuable native forest trees of the United States. Its timber has a wide field of usefulness; the nuts furnish a food product with economic possibilities now becoming more generally recognized; and under favorable conditions, the trees are highly ornamental. The botanical range of black walnut covers most of the eastern half of the United States.

The superiority of black walnut wood, also known commercially as "American" walnut—in color, texture, strength, ease of working, and resistance to destructive fungi and insect pests—early made it a favorite with American settlers. In selecting material for buildings, fences, furniture, and interior decoration black walnut was chosen in preference to most other woods.

For making furniture and gunstocks the wood is very well adapted and has been widely used in this and foreign countries.

Because of the important service which the wood rendered during the World War, and its high economic value, the black walnut tree has been planted in many places as a memorial tree. During recent years it has been used to an increasing extent as an ornamental tree in yards and along roadsides. Perhaps the greatest single factor in stimulating walnut planting in the future is the discovery and propagation by nurserymen of superior nut-bearing varieties already available in limited numbers for dooryard, garden, and orchard planting.

At one time the popular interest in growing black walnut centered on the production and profit from trees grown in close plantations, and most of the growth figures previously published were derived

from measuring such stands. From both the timber-growing and financial standpoints, nearly all the results were discouraging. With the change in the market demand to include wide-ringed walnut wood, which is capable of being finished with an attractive figured grain, the aim in planting and growing walnut timber has changed largely to that of securing the most rapid growth of the individual tree. This is attained by spacing the trees widely and growing them mostly in small groups or singly as individual trees. This arrangement, furthermore, stimulates early and heavy production of nuts and thereby increases the money returns.

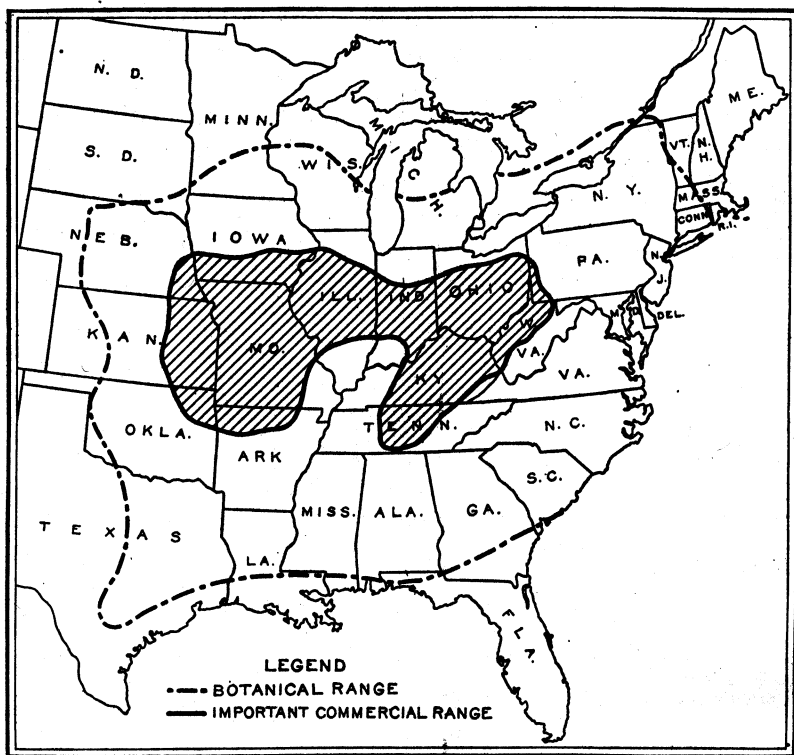


FIGURE 1.—Botanical and important commercial ranges of the black walnut

Black walnut thrives only on very good, deep, moist, well-drained soils. To attempt to grow it on very sandy, very poorly drained, or very thin soils will most certainly prove a mistake.

RANGE AND SUPPLY

The black walnut is native over the greater portion of the eastern half of the United States. Originally, it was most abundant and the trees attained their largest size in protected coves and rich valleys in the Appalachian region and the fertile bottom lands of the Ohio and central Mississippi River basins. The approximate boundary line of its botanical and commercial ranges are shown in Fig-

ure 1. The commercial range includes the area where black walnut trees are found and are being cut in comparatively large numbers.

Black walnut trees grow naturally along with many hardwood trees. They are seldom found in pure stands, or as the dominant species of hardwood, except, occasionally, over small areas where soil and moisture conditions are particularly favorable. In the Central States, in fertile soils overlying limestone, hackberry, elm, black locust, ash, and several species of oaks are among the trees most commonly found with the black walnut. The remaining supply of black walnut is made up mostly by the isolated trees in the forest and on farms where it has been either preserved or planted. Occasionally the trees are found in groups or stands of considerable size which have been held as an investment.

There is no reliable estimate of the present amount of standing black walnut timber. In 1920 the estimate was 820,000,000 feet board measure, but the trees have since been cut extensively for the market. Probably the amount cut has been considerably greater than the amount of new growth. It is roughly estimated that the total amount of merchantable walnut timber in standing trees is from one-fourth to one-third less than it was in 1920. States important in the production of walnut timber are Missouri, Illinois, Kentucky, Ohio, West Virginia, Iowa, Tennessee, Arkansas, Indiana, Texas, and Virginia. Seventeen other States are less important.

The following estimate (Table 1) of the amounts of standing walnut timber in 1920 may be helpful in indicating the probable relative importance of the various States in the production of this species:

TABLE 1.—*Estimated amounts of standing black walnut timber in various States in 1920*¹

State	Million board feet	State	Million board feet	State	Million board feet
Missouri.....	107	Texas.....	37	Georgia.....	8
Illinois.....	79	Virginia.....	29	South Carolina.....	7
Kentucky.....	67	Kansas.....	27	Alabama.....	6
Ohio.....	63	Pennsylvania.....	26	Maryland.....	5
West Virginia.....	60	Nebraska.....	18	Mississippi.....	4
Iowa.....	60	Oklahoma.....	18	5 others.....	10
Tennessee.....	60	Michigan.....	15		
Arkansas.....	46	North Carolina.....	14	Total.....	820
Indiana.....	44	Wisconsin.....	10		

¹ From Department of Agriculture Bulletin 909, Utilization of Black Walnut.

WHERE WALNUT GROWS BEST

Black walnut grows best in fertile clay or sandy loam soils underlaid by clay subsoils, and in alluvial soils that are both deep and moist, and well drained. (Fig. 2.) It is not suited to extremes of temperature or moisture and therefore is not found in the extreme northern part of the country, the far South, at high altitudes, or in arid, excessively alkaline, wet, or acid soils.

Black walnut belongs on soils of the better agricultural grades. It is a mistake to try to grow it on any but the better situations except where early steps to increase the fertility of the soil are to be taken.

The tree is fairly adaptable, however, and is not uncommonly found in sections which but partly meet its ideal requirements. It has been successfully transferred to at least some parts of nearly every State. In protected situations near the outer limit of its

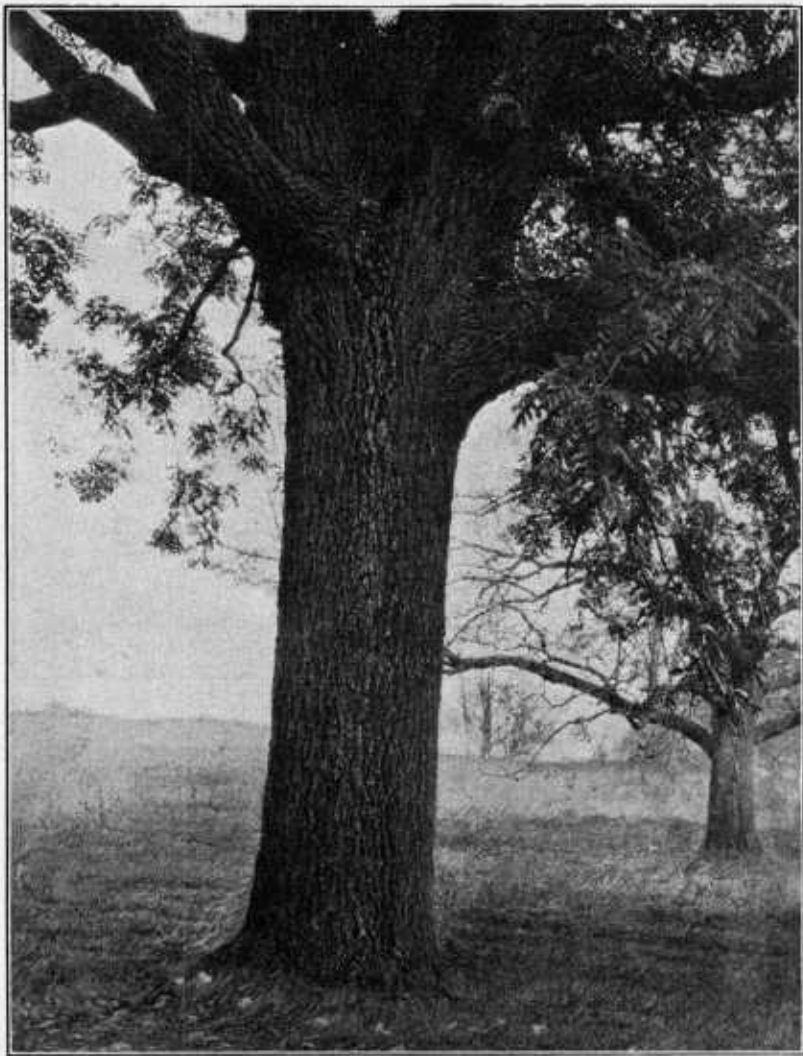


FIGURE 2.—Black walnut is native over a large part of the eastern half of the United States. It grows best in rich moist soil, but is found growing naturally in many different kinds of soil and locations. This large, fine tree grew in south-central New York, in the northeastern portion of the natural range for the black walnut

natural range, it frequently attains remarkable size; for example, a very large, sound tree measuring 10 feet 7 inches in girth at breast height ($4\frac{1}{2}$ feet above the ground) is growing near Grimsby East, in Ontario, a few miles northwest of Niagara Falls.

IMPORTANCE AND USES

THE WOOD

The wood of black walnut—or American walnut, as it is commonly called in the market to distinguish it from Circassian walnut—possesses a rare combination of desirable qualities which makes it a premier cabinet wood, and sought above all others for many other uses. Relative freedom from warping, checking, or splitting when alternately wet and dry, ease of working with tools, and durability in the presence of wood-decaying fungi and insects are its essential qualities. Further, it is hard, heavy, moderately straight-grained, stiff and strong, and takes a high polish. Because of its dark color, which prevents stains from showing, and because the characteristic texture of its grain makes it easily gripped by the hand, black walnut is especially suited for gunstocks, automobile steering wheels, and many other special uses. Since the wood has become increasingly scarce and valuable, the sapwood is being stained by steaming, and accepted as equal to the heartwood. During the World War, it was one of the woods chiefly used for airplane propellers, and the shells of the nuts were used in manufacturing carbon for gas masks.

Black walnut is used extensively for furniture. Old walnut furniture was built mostly of solid pieces of the dark-colored and close-ringed wood from forest-grown trees. More recently there has been a strong demand for richly figured walnut furniture made with veneers from fast-grown, wide-ringed, lighter-colored, and coarse-grained wood. Large stumps and logs from trees grown in the open, rather than forest-grown walnut, yield this kind of wood. Black walnut has long been a standard and favorite wood for musical instruments, notably pianos and organs, and for sewing-machine tables, caskets, cabinetwork, cases, picture frames, moldings, and many forms of ornamentation.

In the more remote districts, black walnut is still in demand for farm gates, fence posts, and other uses requiring a strong wood that is durable under conditions of widely varying heat and moisture. Its increasing scarcity and value are, however, rapidly putting an end to its use for such purposes.

THE NUTS

At present, black-walnut kernels are used principally in making candy and ice cream. They are, however, also used to a large and growing extent, in breads, cakes, salads, and other foods. In some eastern cities, black-walnut kernels are sold raw in increasing quantities by dealers in other kinds of nuts. During the late fall and winter they have also been commonly sold at fruit stands.

AS AN ORNAMENTAL AND MEMORIAL TREE

At its best, the black walnut possesses surpassing beauty of form and foliage, and is of majestic size.

The trees pictured on the title page and in Figure 2 show their beauty and the great size to which they frequently grow. The trunk of the tree on the title page measured 14 feet 5 inches in circumference at breast height. It was photographed in 1918. In the

same year there stood by the roadside in Locust Valley, 3 miles west of Oyster Bay, Long Island, N. Y., a black walnut tree measuring 15 feet in girth at breast height. A tree in northwestern Illinois which, when cut, measured approximately 6 feet 6 inches across the stump, has been reported.

Objections to black walnut for ornamental use are frequently raised on the grounds that the tree grows slowly, comes into leaf late in the spring, sheds its foliage early in the fall, and that shrubbery can not be grown under it except with great difficulty. These objections undoubtedly deserve consideration, but all may largely be overcome by providing suitable environment for the walnut trees, and its competition with shrubbery is no more damaging than that of most other kinds of trees.



FIGURE 3.—Two unsprayed black walnut trees in Lancaster County, Pa., showing the differences among individual trees in their natural tendency to shed or retain their foliage. When trees which do not defoliate early are desired, seed should be selected from parent trees having that characteristic

In fertile soils, with proper moisture and tillage, the black walnut is one of the most rapid-growing American hardwoods. A growth of 4 feet in height in a single season by trees raised from nuts and planted in rich soils, is noted so frequently as to demonstrate clearly that the rate of growth is largely in the hands of the planter.

The hardiness of the black walnut is due mainly to its ability to resist spring freezes because of late leafing. Its first leaves and flowers usually appear well after most other trees have taken on their full summer appearance.

The early falling of the leaves in autumn is largely caused by fungi and insects, both of which may be counteracted largely, if not wholly, by spraying. The time at which the leaves fall depends to some extent on the individuality of the tree. Figure 3 illustrates two unsprayed trees in Lancaster County, Pa.—one almost entirely denuded, and the other still in full leaf, when both were

photographed late in September. Undoubtedly, by selecting seed from trees that have these tendencies, much might be accomplished toward developing trees that leaf out early in the spring and shed late in the fall.

The black walnut is especially well adapted for planting along highways and private driveways, where avenue trees are desired. Its effectiveness for this purpose is illustrated in Figure 4.

In localities favorable to the growth of black walnut, north of the limits of the pecan, which, broadly speaking, may be regarded as the thirty-seventh parallel, it is doubtful whether any other species will give value in human food, reserve timber supply, shade, and ornamental effect equal to that provided by the black walnut.



FIGURE 4.—Black walnut as a roadside tree. The favorable results are shade, pleasing appearance, and the production of crops of edible nuts

It is difficult to maintain a good growth of ordinary shrubs under the branches of black walnut trees, but grass will grow luxuriantly in fertile soil up to the very base of the tree, as is shown on the title page.

The utility of the wood and the desirable qualities of the black walnut as a tree, together with the frequent and prolific crops of edible nuts, all justify the use of black walnut as a memorial tree. It grows well over a wide range; grows rapidly in favorable soils; is comparatively free from serious attack by insects and fungous diseases; and is attractive in form, long lived, and attains large size.

RELATED SPECIES

The black walnut is closely related to the American butternut (*Juglans cinerea* L.), the Japanese walnut (*J. sieboldiana* Maxim.), the Persian (English)¹ walnut (*J. regia* L.), the Mexican walnut

¹ The wood is sold as Circassian walnut.

(*J. rupestris* Engelman), the (southern) California walnut (*J. californica* Watson), the Hinds, (northern California) walnut (*J. hindsii* Jepson), and to various other less important species. It belongs to the same botanical family as the hickories, including the pecan, but to a different genus. It is not easily confused with any other kind of walnut, except to some extent with those of the West and Southwest, which are more dwarf in habit, slower in growth, and of finer foliage. The black walnut freely hybridizes with most of the others blossoming at the same time, except the butternut, where grown in close proximity. Scions of the black walnut may be successfully grafted on stocks of any of the other kinds, and vice versa. However, no other native species is equal in timber value to the eastern black walnut and no other native has so great a geographic range, nor are the nuts of equal value.

BLACK WALNUT HYBRIDS AND THEIR USES

Certain species of walnut hybridize so readily that when pure types are desired it is not safe to plant the seed of these kinds where cross-pollination may have taken place. On the Pacific coast hybrids between the eastern black and the indigenous species are known as "Royal" and those between any black walnut and the Persian walnut as "Paradox."

The Royal walnut is an exception to the usual rule of hybrids, in that ordinarily it is a heavy bearer of nuts of good or at least fair quality. This hybrid was once advertised widely as a timber tree, but its actual value for timber has not yet been determined. Such reports on the Royal walnut in the Eastern States as have come to the attention of the writers are conflicting. So far as is known, it has not been planted extensively in any part of the country. Until experience has demonstrated the worth of the Royal walnut as a forest tree it should be planted on a conservative basis rather than on a large scale for commercial purposes.

Natural hybrids of the black walnut and the Persian are not unknown in the Eastern States. Except on the Pacific coast, however, walnut hybrids are not numerous; nor are they being systematically put to good use, as is the case in the West, where to a limited extent the Royal serves as a stock upon which the finer varieties of Persian or "English" walnuts are grafted.

In common with hybrids of other species of plants, those of the walnut range in vigor from rank growth to the opposite extreme. The proportion of individual hybrids suitable for use as stocks is not necessarily high. Such hybrids are at a further disadvantage for this purpose because hybrid forms seldom reproduce themselves, even fairly true to type, from seed. Therefore new seed known to have developed from cross-pollinated flowers must be obtained each year, and consequently, desirable as good hybrids might otherwise be, they are available only at considerable expense of labor and the hazard of great uncertainty and are to be had by but few nurseries.

The crossing of walnuts in order to perfect desirable stocks and to improve varieties is a field thus far little developed. This is no doubt largely because of the length of time commonly thought necessary for walnut trees to come into bearing and for the results of such hybridization to become known. Tree breeders commonly save

many years by grafting scions of young seedlings upon tops of older trees. In this way new seedlings are quickly brought into bearing.

Because it offers possibilities of bringing into existence not only superior varieties or stocks or both, but also valuable ornamental or timber trees, the hybridizing of various kinds of walnuts is a particularly inviting field for the plant breeder.

GROWING BLACK WALNUT FOR TIMBER

WHERE TO PLANT

Black walnut may profitably be planted in unused or so-called "waste" places about the farm and in good-sized openings in woodlands. Rough, hilly places, with good soil but otherwise poorly



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FIGURE 5.—Steep hillside with rock outcrops and good soil, a suitable place for planting black walnut trees

adapted to successful agriculture, large fence corners, fence rows, hollows, ravines, stream banks, and large pockets of good soil among rocky outcroppings in fields and pastures are excellent places for growing black walnut. Often the mistake is made of allowing sycamore, soft maple, alder, willow, beech, black gum, dogwood, and other inferior species to occupy places that offer favorable conditions for walnut. In limestone regions spots of deep soil near ledges and outcroppings are good places for walnut. (Fig. 5.)

Black walnuts may also be grown about the farmyard as shade trees. In such locations nut trees are especially appreciated and profitable. Black walnut is one of the most desirable trees for stretches of good soil in roadside planting. The open foliage casts only a light shade.

Planting black walnut in the larger openings in woodlands having good soil and moisture conditions improves the composition of the forest and increases the future money returns. It is substitut-

ing good trees for poor ones—for the poor ones are usually the first to occupy such openings whenever nature is allowed to take its course. Since black walnut requires an abundance of light, it should never be underplanted in small openings in woodlands of good-sized trees, or in mixtures with any faster-growing trees. Its crown must be fully exposed to overhead light and it must have an ample supply of side light. The foliage, or crown, of black walnut is open, seldom forming sufficient shade to exclude grass. For this reason it is favored for fields and pastures. In the bluegrass areas underlaid with limestone, the most luxuriant growth of grass is found, as a rule, beneath black walnut trees. The open form of planting suggested above will tend to keep alive the lower limbs, and the trees may require occasional pruning, although black walnut does not retain these branches so tenaciously as do the shade-enduring kinds of trees.

Plantations of black walnut growing in a regular formation and covering tracts that are sometimes several acres in area, have been established in considerable numbers, more especially a few decades ago. These are scattered widely from Ohio to Nebraska and south to Georgia and Texas. Close plantings of this sort should be attempted only on good soil and in accordance with suggestions found in the discussion of close or regular planting. Rich soils in large areas are usually more profitable when devoted to farm crops.

Planting in the various situations suggested, often at the expense of only a little labor, will be a step toward securing useful and money-making trees on parts of the farm which would otherwise be idle. Many thousands of walnut trees—formerly growing in cultivated fields and pastures and affording refreshing shade as well as annual crops of nuts—have, in years of high timber prices, been cut and sold. Many of these need to be replaced.

PLANTING THE NUTS

Black walnut may be started by planting the nuts where the trees are to grow or by growing seedlings in a nursery and transplanting them at 1 year of age. It is advisable to select seed nuts carefully, with regard to their size and quality and the vigor of the tree by which they are produced. A bushel of hulled walnuts contains from 1,100 to 1,400 nuts and weighs about 50 pounds.

Planting the nuts directly in the field has generally been regarded as the better method, but this may not be advisable if squirrels or hogs are likely to cause damage or loss, or if the soil heaves badly because of frost. The menace from rodents can be reduced to some extent by using traps or poisoned bait. Heaving of the soil because of frost may be counteracted by placing straw, grass, or leaf litter over the seed spot after planting the nuts. If the nuts are planted at the proper time in the spring, when most of them germinate in a short time, the danger of loss from these causes is greatly reduced. Usually a small percentage of the nuts fails to germinate the first season.

The unhulled nuts may be planted in the fall, or early in the following spring. If not planted in the fall or early winter, the nuts must be hulled and stored with considerable care in order to get good germination from spring planting. Late fall planting can

often be done after the rush of farm work is over. The seed is then in place to germinate with the opening of spring. Since it is unlikely that every nut will prove fertile, two should be placed in each hole, if a complete stand is desired, and if both come up, one should be pulled or cut off well under ground in midsummer.

The nuts should be covered about 2 inches deep, and the soil pressed down firmly to prevent rapid drying. Shallow planting, 1 to 3 inches deep, with a light mulch, ususally gives better results than planting 4 to 6 inches deep. In loose, deep soil in nurseries, many walnuts are planted in furrows opened by a plow to a depth of about 4 inches.

In planting walnuts, a mattock or broad pick may be used. In sod it is well to dig up the soil for a foot or so around the seed spot before planting, in order to check early growth of grass or weeds. If the soil is not hard fall planting may be accomplished quickly by simply pressing the nuts an inch or two into the ground with the heel and scraping some soil over them, but the results are likely to be less satisfactory than those from more careful planting.

If planted in the spring, the nuts are removed from storage (see below) about the time germination begins to take place, and planted at once. It will be found that most of the kernels are swollen and the halves of the shell more or less loosened after winter keeping. Therefore they require very careful handling in order to prevent injury. In fact, it is well to take only the sprouted nuts, leaving the hold-overs until the following spring. The sprouted nuts are carefully placed in well-loosened soil and covered with about 2 inches of topsoil.

A spacing of 30 feet apart in single rows along fences or lanes and 40 or 50 feet along highways has proved suitable. If trees are originally placed 20 feet apart along fence rows, the alternate trees should be removed, in later thinnings, in order to leave 40-foot spacings in the final stand. In group, stand, or orchard planting the spacing may be 30 to 60 feet apart each way, with other trees interplanted if desired as described on page 13. For orchard planting the distance should be from 50 to 60 feet each way.

STORING SEED NUTS OVER WINTER

In holding walnuts over winter for spring planting, it is essential to prevent the kernels from drying and to keep them cool, in order to prevent too early germination. The nuts must not be allowed to heat in large piles or to soak long in water. If kept over winter in proper condition, most sound nuts will germinate the following spring, and the remainder will germinate a year later, if undisturbed. Walnuts retain their germinating power much better than do acorns and chestnuts.

The nuts may be stored in a cellar, under a northern porch, or in a soil pit dug for the purpose. The pit probably gives the best results, although good results often come from either of the other methods. To be stored successfully walnuts should be mixed with sand, and kept moist and cool enough to prevent early sprouting. It is possible also to keep nuts sound over winter if they are spread out on the ground and covered with a layer of soil, on the north side of a building, where they will be safe from the effect of unusual

warm spells. The spot must be well drained. Freezing is not harmful if the nuts are properly stored, particularly if it does not alternate with frequent thawing. For storing or stratifying the nuts in a soil pit, a well-drained location should be chosen. A trench is opened from 8 to 12 inches deep, from 2 to 3 feet wide, and as long as necessary for the quantity of nuts to be stored. A layer of nuts is placed in the bottom of the pit and covered with about 1 inch of sand or sandy loam as shown in Figure 6. Other layers are alternated and the pit is finally covered with soil mounded over the center so as to shed water. It is essential to open drainage ditches on both sides to prevent excess water from entering the pit.

Nuts stored over winter as here described are particularly liable to depredations of squirrels and various other rodents, and if these animals are in the neighborhood it will be necessary to use wire screen for protection. Nuts have often been lost over winter be-

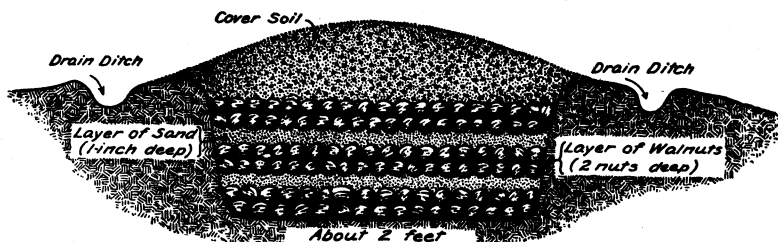


FIGURE 6.—Soil pit for storing black walnuts over winter—known as stratifying

cause of poor storage conditions which have caused them to heat and mold, or to sprout before planting time, so that it was impossible to handle them without too much damage to the roots.

GROWING AND PLANTING SEEDLING TREES

Black walnut seedlings are easily grown in the nursery, but as they have long taproots, they require special care in digging for transplanting. In growing seedlings for timber purposes, the nuts should be planted close together, almost touching one another, in furrows 3 feet apart, and covered about 2 inches deep. In rich soil and with thorough cultivation, the seedlings should attain heights of from 8 to 15 inches during the first season, as shown in Figure 7. They are then ready for transplanting to their permanent positions in the fields or woods. Early during the following spring they should be taken up carefully and the taproots cut off with a sharp knife at lengths of from 8 to 12 inches. Nursery concerns grow black walnut seedlings and ship them long distances successfully by following these precautions. The roots should be kept moist at all times, and when the seedlings are set the soil should be well firmed about them. A mulch of leaves, straw, paper, or other suitable material about the young trees will help in conserving moisture during dry spells and in checking weed growth. If proper care is observed, few trees need be lost in transplanting.

Planting nursery-grown seedlings in the field or woods is obviously more expensive than planting nuts, and is usually unnecessary. If

seedling trees are used, however, the resulting stand is likely to be more uniform and generally more satisfactory, especially if hogs or rodent pests are present. In competing with weeds and grass, young trees, a foot or more high when planted, have some advantage during the first year over seedlings grown from nuts planted in place.

REGULAR STAND PLANTING

Close plantations of black walnut utilize all the ground for timber production. Good agricultural soil is necessary, and because profits are likely to be larger from field crops than from timber, plantations of any considerable size are not generally advisable. Experience shows many mistakes in using tracts of rich tillable



FIGURE 7.—Growing black walnut seedlings in nursery rows. The seven rows at the right are 1 year old and are ready for permanent transplanting. While this method is more expensive at first than planting the nuts in place, it usually gives more uniformly satisfactory results in the end

soil for growing walnuts. Open-grown walnut trees produce logs of merchantable size and good crops of nuts much sooner than do close-grown trees, while at the same time permitting pasturing.

In establishing regular plantations the soil should, if possible, be prepared before planting by breaking up the ground. In the prairie region complete breaking and harrowing of the ground is advised, for it is often possible to put in agricultural crops for one or two years before planting walnuts. The nuts, or the nursery-grown seedlings, are usually planted in rows. The spacing will differ in different localities, but for combined timber and nut production an interval of 30 to 40 feet each way is probably a good distance. The spacing and arrangement of trees in walnut plantations will depend largely upon whether the primary aim is to produce timber or nuts, or a combination of both.

Since black walnut is an open-foliaged tree, making only a light shade, better results may be expected in close plantations if the

walnuts are interplanted with some heavier-foliaged tree which grows somewhat slower. The heavier-foliaged tree will be helpful in shading the ground against the growth of weeds and grass, in stimulating a rapid upward growth, and in shading out the lower limbs of the walnut. Later the heavier-foliaged trees should be cut out, leaving the walnut to finish its growth free from over-competition for light and soil space. Trees having the necessary requirements for such a mixture are not numerous and should be selected with care. For this purpose black locust (or "yellow" locust) is suggested for planting south of the Potomac and Ohio Rivers, and sugar maple or red oak north of these rivers. Nitrogen produced in the root nodules of the black locust feeds the adjacent walnuts. In areas where the apple industry is not important, the red cedar might well be planted. Figure 8 shows plans for such interplanting of black walnuts with other kinds of trees.

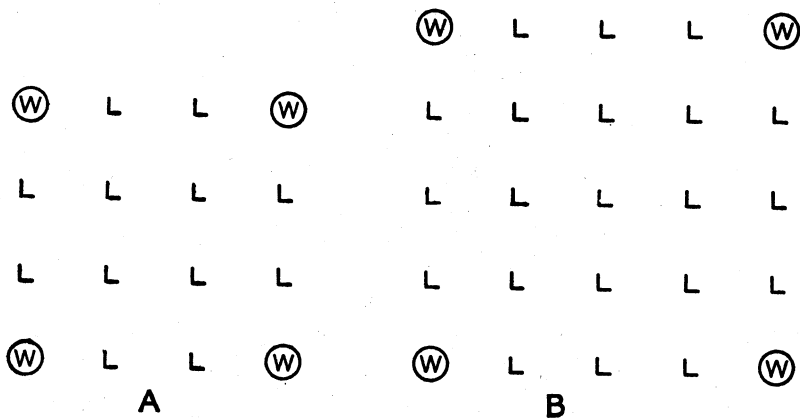


FIGURE 8.—Interplanting black walnut trees with filler trees. W indicates a black walnut tree and L a filler tree. A, Walnut trees planted 30 feet apart and interplanted with some other kind spaced 10 feet apart. This will require 49 walnut seedlings and 386 of the other kind or kinds per acre. B, Walnuts are here spaced 40 feet apart with filler trees every 10 feet apart, requiring 27 walnuts and 408 other trees per acre

CARE OF PLANTED TREES

In pastures and other places devoted to grazing the young trees must be protected against stock with temporary wire or board inclosures around individual trees or groups of trees. Volunteer walnut trees springing up along fence rows and roadsides should be cared for in the same way and conserved in preference to less valuable species. Excessive grazing is always inadvisable in stands of timber, for it results in damage to the trees both directly and indirectly through packing the soil and breaking up the protective leaf litter.

Among insect enemies of black walnut, the tent caterpillar is perhaps the most serious, as it is the most common and conspicuous. Unless checked, it sometimes completely defoliates a tree. It may be destroyed by spraying with an arsenical solution, or better, by capturing the insect masses when they are congregated on the tree trunk for molting. For information about harmful insects and methods of exterminating them, write to your State entomologist or

to the Bureau of Entomology, United States Department of Agriculture, Washington, D. C. The black walnut is comparatively free from tree diseases, including the fungi which, in many other kinds of trees, cause wood rot. The foliage is, however, susceptible to certain diseases causing the leaves to fall, and spraying may become necessary, particularly when the trees are grown for nut production. As far as possible, seed should be chosen from trees known to be resistant to such diseases.

While black walnut, grown in close stands, sheds its lower branches more readily than do the other kinds of trees which endure more shade than the walnut, the lower branches of walnut trees grown in the open usually persist for some years, and should be removed from time to time in order to develop clear logs, which bring the highest prices.

GROWTH AND RETURNS

In good soil and in situations to which it is adapted, the black walnut is a moderately rapid grower. In central Indiana and Ohio "grove" walnut averages something like 35 feet in height at 20 years, 53 feet at 30 years, 68 feet at 50 years, and 82 feet at 100 years. This is a growth of nearly 2 feet a year at 20 years, slowing down gradually to about a foot a year at 35 years. (Table 2.)

TABLE 2.—*Growth in height of black walnut in rather open stands in central Indiana and Ohio*¹

Age.....years..	10	20	30	40	50	60	70	80	90	100
Average height of trees.....feet..	13	35	53	62	68	72	75	78	81	82

¹ From Department of Agriculture Bulletin 933, Black Walnut: Its Growth and Management.

The measurement of 128 trees, scattered through 6 States, and ranging in age from 10 to 100 years, showed a growth of 1 inch in diameter (at breast height) every 2½ years; at 30 to 50 years, about an inch in 3 years; at 50 to 70 years, an inch in 4 to 5 years. (Table 3.)

TABLE 3.—*Growth in diameter (breast high) of black walnut trees under average conditions (measurements of 128 trees in six States from Virginia to Illinois)*¹

Age.....years..	10	20	30	40	50	60	70	80	90	100
Average diameter of trees.....inches..	1.2	5.0	8.8	12.5	15.7	18.3	20.6	22.2	23.8	25.0

¹ From Department of Agriculture Bulletin 933, Black Walnut: Its Growth and Management.

In considering rate of growth it is necessary to distinguish clearly between open-grown and close-grown trees and stands. (Fig. 9.) The intimate relation between the supply of light and soil moisture and the rate of development of the individual tree is generally well known. In growing black walnut the grower is concerned essentially

with the individual tree rather than with large numbers in a stand, as is the case with pines, for example. Table 4 indicates fairly well the board-feet measure of black walnut trees of various ages



FIGURE 9.—Open spacing results in more rapid growth and earlier production of merchantable timber

in groves in the Ohio Valley. The figures given do not apply to single trees or to rows of trees grown in the open, which would show faster growth.

TABLE 4.—*Volume in board feet of black walnut trees grown in groves in the Ohio Valley*¹

Age.....years	50	60	70	80	90	100
Merchantable contents or volume.....board feet	48	100	150	200	260	320
Average yearly growth in volume:						
Current or present rate.....do		5.2	5.0	5.0	6.0	6.0
Average rate from the beginning.....do	1.0	1.7	2.1	2.5	2.9	3.2

¹ From Department of Agriculture Bulletin 933, Black Walnut: Its Growth and Management.

Information on 12 planted stands of black walnut, from 12 to 42 years old, is given in Table 5. Because of very close spacing and crowding, the trees, even at the greater ages, have hardly reached saw-log sizes, and hence the yields are low and shown in cords.

TABLE 5.—*Average measurements of 12 closely planted stands of black walnut of various ages*¹

Age, years	Average height of trees	Average diameter (breast-high) of trees	Yield per acre	Trees per acre (at present)	Original spacing when planted	Kind of soil	State
	<i>Feet</i>	<i>Inches</i>	<i>Cords</i>	<i>Number</i>	<i>Feet</i>		
12.....	27	3.8	7.5	512	4½ by 6...	Black sandy loam...	Indiana.
25.....	42	6.3	14.8	359	8 by 8.....	Black loam.....	Iowa.
28.....	42	5.5	17.9	548	8 by 8.....	do.....	Do.
28.....	26	4.1	8.6	708	1½ by 7.....	do.....	Do.
28.....	41	7.0	20.0	342	4 by 4.....	Black sandy loam...	Do.
31.....	51	7.0	34.6	492	4 by 5.....	Black loam.....	Do.
32.....	54	8.3	24.2	239	5 by 13.....	do.....	Do.
35.....	46	8.7	12.4	149	8 by 9.....	Black sandy loam...	Do.
37.....	44	7.7	9.1	136	8 by 8.....	Black loam.....	Do.
38.....	55	8.6	33.8	303	8 by 8.....	do.....	Illinois.
40.....	52	8.3	31.8	321	4 by 4.....	do.....	Iowa.
42.....	66	12.3	39.6	138	7 by 12.....	do.....	Do.

¹ Department of Agriculture Bulletin 153, Forest Planting in the Eastern United States.

An extremely fast-growing and profitable walnut tree grew by itself, in deep soil, near a small stream on a farm in central Tennessee. The tree when cut was 76 years old and yielded two body logs, each 12 feet in length, and three short top logs, scaling a total of 1,150 board feet, and selling at the railroad for \$164.84. The butt log (fig. 10) measured 35 inches in diameter at the top end, scaled 710 board feet, and loaded on the car brought the owner \$95.85. These figures probably are close to the maximum average production for single trees—an average growth of nearly 15 board feet per year for 76 years, and an average gross return of \$2.17 per year.

In general it takes from 40 to 60 years to grow merchantable walnut lumber. Assuming a rate of growth of 5 to 10 board feet per year for open-grown trees, and a value of \$50 to \$70 per thousand feet standing on the stump, walnut trees at 60 years of age will return gross incomes of \$15 to \$42. The value of walnut timber per board foot increases rapidly with increase in the size and clearness of the log.

GROWING BLACK WALNUT FOR NUTS

THE NUT INDUSTRY

The kernel of the ordinary black walnut is extracted only with considerable difficulty. Usually it is taken out in quarters or smaller pieces. A Baltimore firm dealing largely in walnut kernels estimates that not more than 35 per cent are received as quarters. Fully 65 per cent come in smaller particles. The proportion of perfect halves is negligible. In spite of the difficulty in cracking, the market demand for nuts in the shell is materially increasing. Prices to the grower normally range from \$1 to \$2 per bushel, depending largely upon the size and cracking quality of the nuts, the character of the kernels, the size of the crop, and local market conditions.



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FIGURE 10.—Butt log of black walnut tree 76 years old, grown on a farm in middle Tennessee, from which two body logs and three limb logs, scaling 1,150 board feet, were cut. Delivered on the car, this log (35 inches in top diameter) brought \$95.85 and the five logs \$164.84. It cost \$15 to cut and haul the logs

In certain districts, notably in eastern Tennessee, western North Carolina, and southern West Virginia, large quantities of walnuts are gathered each fall and are cured and cracked in early winter by the family. The kernels are bought by local merchants, who ship to large dealers, mainly in Baltimore, Philadelphia, St. Louis, Brooklyn, New York, and other northern cities.

The walnut-kernel industry is much more important than is generally realized. From the southern Appalachian Mountain States to northern Arkansas and northward through the Ohio Valley region are many nut-cracking concerns, some of which handle as many as 10 to 25 tons of black walnuts yearly. A few years ago one county in eastern Tennessee was reported to have shipped 210,000 pounds of walnut kernels in a single year. In one day during the height of the season dealers in the county seat paid farmers \$7,000 for kernels. Many families get much of their yearly cash income by extracting and marketing walnut kernels.

While crops of black walnuts invariably occur in some parts of the country each year, heavy crops are unlikely in the same parts oftener than once in two years or in large sections oftener than once in about five years. A barrel of black walnut kernels weighs from 200 to 225 pounds. Green walnuts if husked promptly after falling from the trees will be reduced in bulk to from one-third to one-fifth their original volume. In many parts of the country, the proportion of quarter kernels obtained in cracking is not more than 6 or 8 per cent of the total weight of the nuts. With certain of the named varieties, this is frequently more than 25 per cent.

The black walnut kernel industry first assumed recognized importance about 1900, when the farmers were receiving from 6 to 8 cents a pound for this product. In 1917, after many fluctuations, the price had risen to 15 cents for the best grade. Then there was a phenomenal rise during the seasons of 1918-19 and 1919-20, when the prices went to 50 and 60 cents a pound. In 1920-21 they dropped to about 35 cents and in 1922 ranged from 35 to 65 cents. Prices in 1931 and 1932 were the lowest for several years, dropping to 18 cents and even lower in many cases.

Walnut kernels are, to an increasing extent, becoming staple commodities. They are commonly sold in the markets of many eastern cities, where they are largely used in the manufacture of candies, breads, cakes, and confections, and to a considerable extent are sold by street vendors in small lots at prices which amount to from 85 cents to \$1.25 a pound.

An Illinois grower who has had long experience in cracking walnuts of the Thomas variety reports no difficulty in selling the kernels on local wholesale markets at about double the average price, and that he not infrequently gets 10 pounds of kernels from a bushel of whole nuts. (See p. 26.)

ADVISABILITY OF GROWING WALNUT TREES FOR NUTS

At present the black walnut nut crop should be regarded as incidental to general farm operations, a by-product of the farm and not a staple money crop. It is strictly speculative. The first known orchard of as many as 1,000 trees was planted in Michigan in the spring of 1924. Since then several others have been planted in Pennsylvania, Virginia, and Indiana.

Upon the advisability of planting black walnut trees for the nut crop, the writers and others conclude that:

Large tracts of fertile, expensive farm land having established value for other crops should probably not be planted to black walnut trees now, if the owner is dependent upon the land for income.

Under present conditions large plantings should be made only on inexpensive yet fertile land such as is most likely to be found at some distance from main highways.

There is enough unused and suitable land available on steep hill-sides, along ditches, stream banks, roadways, private lanes and drives, in fence corners, parks, dooryards, and other places within the range of the species to afford abundant opportunity for rapid and normal expansion of the nut industry at minimum cost. Such development would add greatly to the agricultural wealth of the country with a minimum investment risk.

SELECTING THE SEED

Walnuts to be used for seed, either for timber or for nuts, should come from trees having the characteristics it is desired to perpetuate. Seed from slow-growing, dwarf, spindling, or weak trees, or those especially susceptible either to destructive fungi or to insect pests, should not be used. Seed should be chosen from rapid-growing, vigorous, and symmetrical trees. If trees are to be grown for nut production, the parent trees should be heavy annual bearers of nuts that are large, thin-shelled, easy to crack, and with both parts of the kernel easy to release from the cracked shell as perfect halves. The kernel should be bright colored, plump, rich in quality, and with a flavor pleasant and mild rather than strong.

When seed is to be obtained from a distance it should not come from a locality whose climate is appreciably milder than that where the seeds are to be planted. For example, seed from Kentucky or Tennessee should not be planted in Michigan or Wisconsin, nor seed from Maryland in New England. If good seed can be had from a near-by source, it should be used, although there is no practical objection to carrying seed considerable distances from north to south.

SEEDLINGS VERSUS BUDDED OR GRAFTED TREES

Nut trees grown from seed do not reproduce themselves true to variety. No matter how closely related to each other the two parent trees may have been, or even if self-pollinated, there will always be differences in offspring. Opposite claims are sometimes made by misinformed tree agents. Pictures of a tree inclosed within a tent at blooming time, supposedly to prevent all possibility of inter-pollination, are occasionally shown. Prospective buyers should not be misled by such pictures, but should regard such trees strictly as seedlings of unknown parentage.

The planting of seedling trees for nut production must not be discouraged, as seedlings afford the only practical source of new varieties within reach of the average grower. There are as yet very few varieties of black walnut available from the nurserymen, and all are comparatively new and practically untested, either as to the fruitfulness of grafted trees or as to the adaptability of the varieties to localities other than their places of origin. Therefore, for the present, black walnut planting on an extensive scale must depend almost wholly upon seedling trees. These, of course, may be top-worked later, as superior kinds become available.

Nursery-grown budded or grafted trees are superior to seedlings for orchard planting, because their nuts will be identical in variable characteristics with those borne by the tree from which the scions were obtained. Any differences will be due to environment, age of trees, etc., just as orchard fruits of the same variety show differences when grown in different orchards or localities.

Planting several nuts in one hill where a permanent tree is desired, later budding or grafting the strongest grower with scions from desired varieties, and then removing the other seedlings, is sometimes recommended as a method of establishing an orchard. Although successfully practiced in forestry planting, it seldom produces orchards that are uniform, or as profitable as those in which

grafted trees have been used; therefore, the practice is not recommended. It is exceedingly difficult. At least three nuts should be planted in a hill and it may be that none of the three seedlings will be a strong grower. In that case it will be hard to choose the stock, and grafting on weak stocks is always difficult. The resulting trees are likely to be weak, even though successful unions have been made. The first graft attempted may fail, even in the hands of an expert, and if some grafts succeed and some fail, the orchard will be nonuniform and unsightly from the start. Top-working an orchard requires not only skill of the first order in making the grafts but constant care and attention at frequent intervals for several years. Neglect at any time may ruin the whole venture.

To bring about quick bearing, young, thrifty trees 15 to 30 feet high may be cut back and grafted over with scions from promising varieties.

PLANTING THE ORCHARD

When planted for nut production, trees should be spaced 60 feet apart each way, unless in thin or poor soil, in which case they will not grow so large and may be given less space. Spaced at 60 feet, 12 trees will be required per acre; at 50 feet, 17 will be required; and at 46 feet 8 inches, 20 trees. If the soil is not the best, a large hole should be dug and filled in with top-soil. All injured roots and branches should be pruned away and the tree planted about as deep as it stood in the nursery. Special pains should be taken to set it no deeper than it stood in the nursery. If it is deeper it will either stand in a depression or soil will have to be filled in around the trunk. In the former case, excess surface water will be likely to collect at its base, and in either case the tree will likely have difficulty in surviving.

If the tree has been purchased from an experienced nurseryman the taproot will already have been cut from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet below the surface. Many nurserymen dig and transplant the trees in the nursery at least once before budding or grafting, in order to insure that the taproot is cut, stimulating the development of a lateral root system. The welfare of the tree is materially promoted by this process. If the grower has trees of his own for transplanting, he may dig down on one side of the taproot 2 feet below the surface and cut it off cleanly with a sharp knife or pruning shears one year before it is to be dug for permanent planting.

In the North, results from early spring planting are usually best, while in the South planting from December to February is ordinarily the most satisfactory. In the North, nurserymen commonly dig the trees in the fall and heel them in until spring in order to be ready for early shipment. It is, therefore, usually possible to order the trees for delivery at the precise time they are wanted for planting.

If prices are high, or trees of a desired variety scarce, planters may purchase one or two each of the desired varieties and a year or two later cut buds or scions from them for use in top-working on other trees. In most cases, it is possible to obtain scions for top-working on trees already owned by the planter, either direct from the owner of the parent tree of the desired variety, or from nurserymen or from others having budded or grafted trees.

HANDLING THE NUTS

HARVESTING

Walnuts should be harvested promptly after they fall from the trees, the hulls removed soon, and the nuts spread out to dry lest the kernels become discolored and the flavor rank. When promptly attended to in this way, the kernels will be bright-colored and the flavor not strong. Ordinarily the nuts drop from the trees when ripe and harvesting is merely picking them up from the ground.

HULLING

The hulls may be removed with an ordinary corn sheller, or, if no better device is at hand, holes with diameters

slightly greater than those of the nuts may be bored in a 2-inch plank, and the nuts driven through the holes. So far as known, no machinery has been especially devised for hulling black walnuts. However vegetable-paring machines of the types operating upon the principle of abrasion, now in fairly general use at vegetable canneries, large hotels, and restaurants, have been found highly efficient in hulling and washing by a single operation. These machines, as shown in Figure 11, are about the size of a large washtub, but



FIGURE 11.—Hulling black walnuts with a vegetable-paring machine. This type of machine, of which there are several makes, hulls and washes the nuts thoroughly at a single operation

considerably deeper, are covered with an easily locked lid, and lined on the sides and bottom with a rough surface of coarse granite particles. The bottom consists of a separate plate with an uneven surface, so geared to a motor as to revolve at different speeds.

In experiments conducted by the department, a machine with a capacity of a bushel of unshelled nuts, operated at about 350 revolutions per minute, in five minutes thoroughly hulled and washed fresh green nuts having firm hulls. A like quantity of nuts so ripe that the hulls are soft, can be hulled and washed in about two and one-half minutes. A stream of water constantly played on the nuts while they are being hulled carries away all hull particles through the drainage outlet.

The juice of black walnut hulls is of comparatively no value in the dye industry, although it is often assumed to have such value. All permanent staining power is lost as soon as the hulls soften and turn black.

CURING

As soon as the nuts are hulled, they should be spread on wire screen or boards in layers, preferably not more than three nuts deep. If the weather is damp or the nuts are to be cured indoors, they should be thoroughly stirred daily. When possible, they should be spread out in trays having bottoms of wire mesh placed well above ground to permit free circulation of air below as well as above.

CRACKING

A hammer is ordinarily used for cracking black walnuts. However, an Illinois grower has improvised a cracking machine by the use of which the kernels are extracted much more perfectly than if a hammer is used. It consists of an ordinary blacksmith's vise, within the jaws of which are fixed two plates with shallow cups facing each other so as to fit the nuts. While this implement is slow and requires some practice in order to get the best results, it gives better results than the hammer. Several different types of instruments for cracking black walnuts are now on the market.

If the nuts have been well cured before cracking and not allowed to again become moist, further shrinkage in weight will not be important; but in any event the kernels should be carefully cured after being extracted. Otherwise the price will likely be discounted by the merchant so as to take care of his shrinkage and extra labor cost. Losses from poorly cured kernels are sometimes serious, entire barrels becoming moldy and caking into a nearly solid mass during shipment.

VARIETIES

The term "variety" as used here does not refer to seedling trees but only to those which have been budded or grafted. The significance of the term "Thomas," with reference to the black walnut, is relatively the same as that of "Baldwin" in relation to the apple, "Elberta" to the peach, or "Washington Navel" to the orange.

A considerable number of black walnut varieties have been propagated in the past, although not more than half a dozen have been available at any one time. Probably more were available from nurserymen from 1915 to 1920 than at any time since; probably as many as a dozen varieties were listed in nursery catalogues during that period.

Fewer varieties are now being propagated. At present there are but six varieties of which as many as a dozen trees can be had from any one source. These have been selected, not because of clearly established superiority, but because they were among the first tested, and because no others of such outstanding merit as to replace them have appeared in the meantime.

Several of the most favorably regarded varieties now available for planting are described below. A majority of these show a tendency to begin fruiting at ages comparable with those of grafted apple trees.

M'COY

From near Rockport, Spencer County, Ind., some 15 or 20 miles north of the Ohio River. Discovered in 1917 by R. L. McCoy. Propagated comparatively little. Not regarded as favorably as some others because of low cracking quality, although it sheds pollen early and may prove valuable for cross-pollinating other varieties.

MILLER

Another variety from southern Indiana, regarded favorably for a time but now propagated very little. Cracking quality not the best.

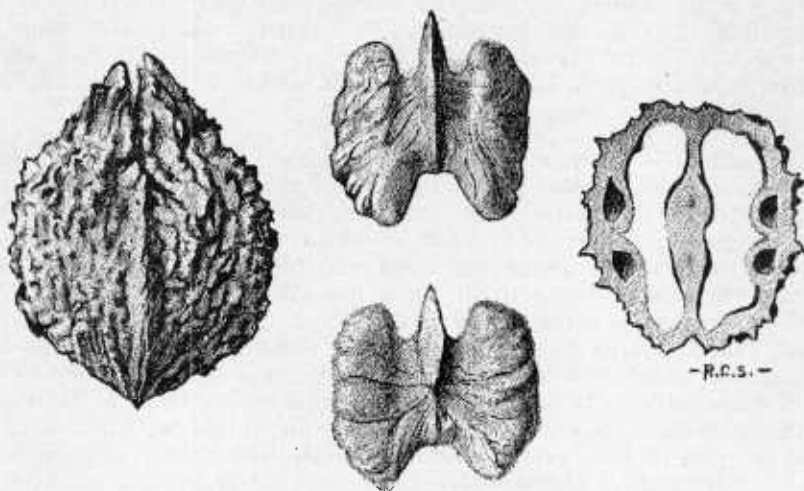


FIGURE 12.—Nut and kernels of the Ohio variety of black walnut

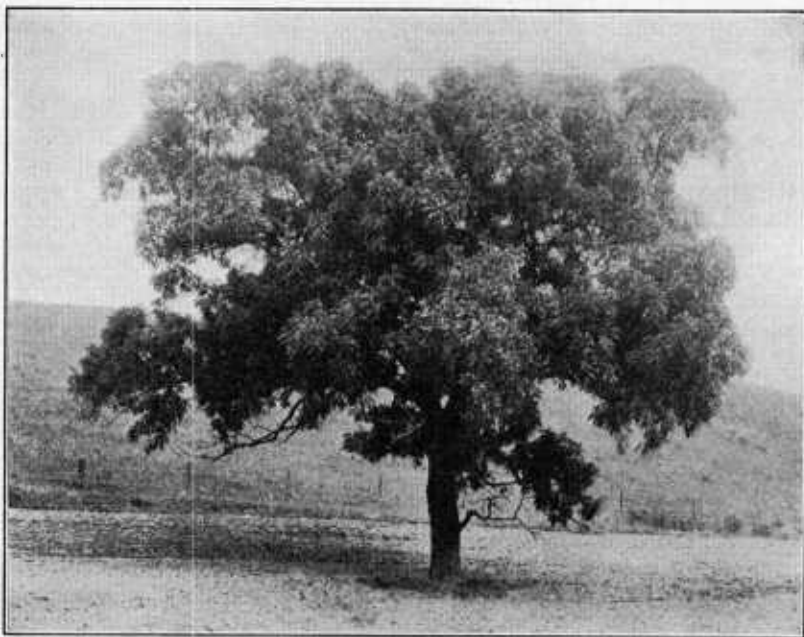


FIGURE 13.—Parent tree of the Stabler black walnut, growing in Howard County, Md.

OHIO

One of the best known and most favorably regarded varieties. From a tree near McCutcheonville, Ohio, discovered by Luther G. Haines. It was first propagated in 1916 by J. F. Jones, Lancaster, Pa., and has since been widely

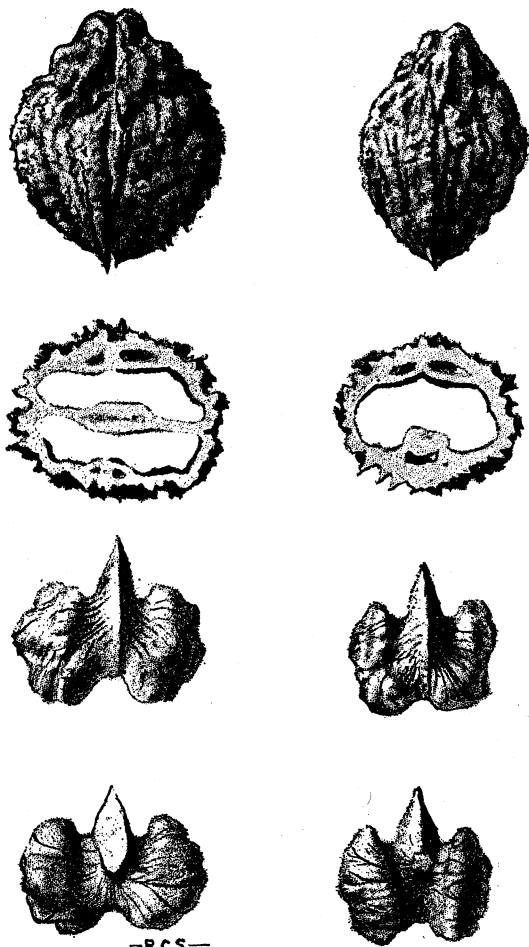
distributed. The parent tree has been a vigorous grower and heavy bearer. The nuts are medium in size, somewhat flattened on the sides, and usually pointed at the apical end. The shells are rather thick but vary considerably from year to year in this respect, as do those of many other varieties. Very often the kernels may be extracted as perfect halves. (Fig. 12.)

PEANUT

An Ohio variety, so named because of the fact that a high percentage of the kernels form as single solid pieces. During the middle nineties it was distributed to a considerable extent for test purposes, but so far as known to the writers, that characteristic for which it was named has not appeared in the nuts of any grafted trees. Such nuts of this variety as have been produced by grafted trees have not appeared to advantage.

STABLER

From a farm in Howard County, Md., owned by A. W. Priebe, of Gaithersburg. It was discovered in 1916 by Henry Stabler, of Sandy Spring, Md., after whom it was named by T. P. Littlepage, of Washington, D. C. Since its introduction this variety has been widely distributed and generally regarded as one of the most promising available from nurserymen. During the past 10 years the yields from the parent tree, shown in Figure 13, have been about 6 bushels every third or fourth year. At other times they have been light, and occasionally there have been complete failures. Like walnuts of many other varieties, the Stabler varies from year to year. It is also variable during the same year, as shown in Figure 14. The shell is invariably thin. Very often, by the use of care while the nuts are fresh and not yet thoroughly dry, the kernel may be extracted without separating the halves or injuring them. The form of the kernel ranges from two full halves to single solid pieces. Usually the latter are the more plump and more easily extracted. In form the nuts greatly resemble the Ohio, but are smaller, thinner-shelled, and much more easily cracked. The flavor of the kernels is rich and pleasing, but regarded by some persons as a trifle strong.



—R.C.S.—

FIGURE 14.—The Stabler black walnut, showing extremes of type. In some nuts the kernel consists of two normally developed halves; in others one half is but partly developed, while in still others the kernel forms as a single solid piece

TEN EYCK

This variety was first called to the attention of the Department of Agriculture in January, 1915, by E. M. Ten Eyck, of South Plainfield, N. J., whose

father owned the parent tree. The thinness of the shell and the superior cracking quality of nuts submitted at that time were so outstanding that the department informed several northern nut-tree nurserymen and others of this new variety. A number of these at once wrote Mr. Ten Eyck for specimen nuts and further information. They were so favorably impressed that they promptly procured scions, with the result that at least two—W. C. Deming, then of Georgetown, Conn., and R. L. McCoy, then of Rockport, Ind.—succeeded in making a small number of successful grafts during the following spring. Since then the Ten Eyck has been one of the varieties most widely distributed by nurserymen, particularly the late J. F. Jones, of Lancaster, Pa.

Ten Eyck nuts are of medium to small size. Specimens of the 1931 crop, grown on grafted trees near Westtown, Pa., ranged from 30 to 60 per pound and averaged 37 to the pound. In a contest conducted by the Northern Nut Growers' Association in 1919 (Ann. Proc., p. 162), Willard G. Bixby, of Baldwin, N. Y., chairman of the committee in charge, reported finding 36.4 per cent kernel for this variety. This record leads all others among the

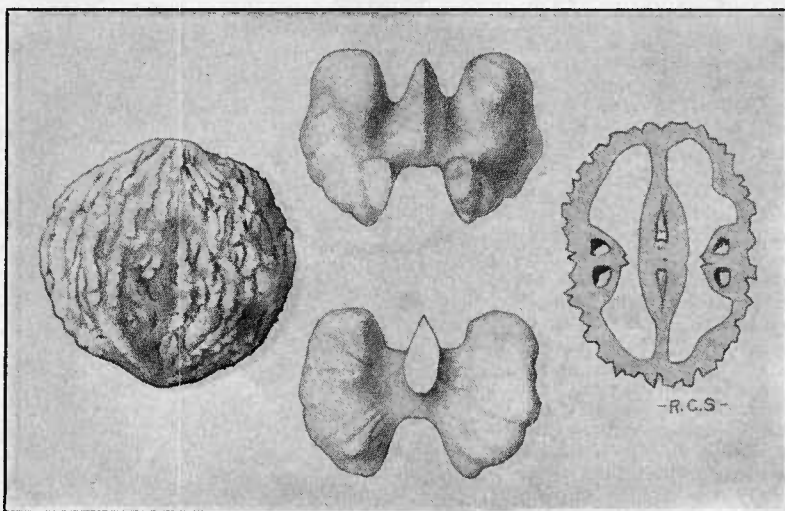


FIGURE 15.—Black walnut of the Thomas variety. (Reduced in size)

several thousand the association has passed upon. However, so far as known, the Ten Eyck has not repeated this performance on any other occasion, although it has been examined many times. The reports on these examinations are invariably favorable in so far as thinness of shell and superiority of cracking quality are concerned. In the departmental studies of 1931, the percentage of kernel was 26.68.

The kernel itself is sometimes undependable, not infrequently being somewhat lacking in plumpness. Whether this is due to seasonal environment, or to an inherent characteristic which could not readily be overcome, or whether nontypical specimens have by chance been most often the ones examined can not now be stated. As compared with most other varieties, the Ten Eyck is late in leafing out and blossoming in spring, and correspondingly late in shedding its leaves in the fall.

The parent tree stands on the old Ten Eyck homestead 4 miles east of South Plainfield, N. J., and a mile or so from the station of Oak Tree on the Lehigh Valley Railroad.

THOMAS

This variety is doubtless represented by more old-bearing trees throughout the country than is any other. It was called to public attention during the early nineties, by J. W. Thomas & Sons, King of Prussia post office, Pa. For more than a decade it was the only variety of black walnut propagated or distributed to any extent. It still is one of the leading varieties. The nuts

are medium to large in size, considerably wider than thick, fairly thin shelled, and much superior to average black walnuts in cracking quality. The kernels are usually plump, light colored, and of pleasing flavor. The nuts are shown in Figure 15.

SOURCES OF INFORMATION AND PLANTING STOCK

For further information on growing black walnut for timber, and for lists of dealers handling seeds or seedling trees, application should be made to State foresters or to the Forest Service, United States Department of Agriculture, Washington, D. C. A number of State foresters are growing 1 and 2 year old seedlings of various tree species suitable for their respective States and furnishing them at the cost of production.

Specific inquiries about growing black walnut trees primarily for nuts should be addressed to State horticulturists or to the Bureau Plant Industry, United States Department of Agriculture, Washington, D. C.

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